

REMARKS

Applicants appreciate the thorough review of the present application as reflected in the Office Action. Independent Claims 2, 6, 13, and 22 have been similarly amended to further define the tip of the top electrode with respect to the bottom electrode and, thereby, further distinguish the cited art. Independent Claim 3 has been amended to depend from Claim 2. Claims 37-44 have been added. No new matter has been introduced by these claim amendments. Applicants submit that the pending claims are patentable over the cited references for at least the reasons discussed below.

Independent Claims 2, 6, 13, and 22 are Not Anticipated by Casagrande et al.

Pending Claims 2-19 and 22-23 stand rejected as anticipated under 35 U.S.C. § 102(e) by United States Patent Application Publication No. 2004/0012009 to Casagrande et al. (hereinafter "Casagrande").

Claim 2 has been amended to further define the tip of the top electrode and now recites (emphasis added):

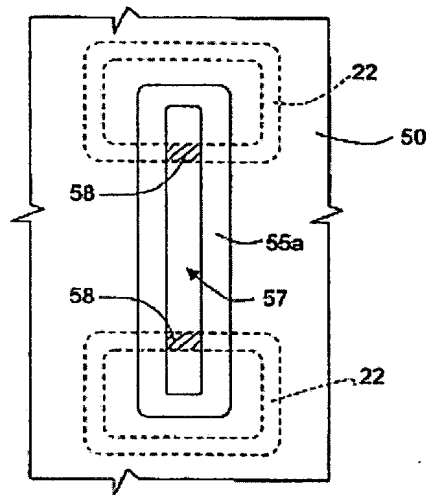
2. (Currently Amended) A phase changeable memory cell, comprising:
a substrate;
a bottom electrode on the substrate;
a phase changeable material layer pattern on the bottom electrode; and
a top electrode on the phase changeable material layer pattern, the top electrode having a tip that extends toward the bottom electrode, wherein the bottom electrode has a planar portion and a vertical portion, and wherein the tip of the top electrode has a center along a length and width that is aligned with a center of a facing surface of the vertical portion of the bottom electrode.

Accordingly, the tip of the top electrode has a center along a length and width that is aligned with a center of a facing surface of the vertical portion of the bottom electrode. Exemplary embodiments of amended Claim 2 are illustrated by FIGS. 6A-B of the present application.

In sharp contrast, Casagrande discloses an electrode 40 that has a narrowed lower portion with an extended rectangular shape that extends across a plurality of

cup shaped electrodes 22. For example, Casagrande shows in FIG. 22, below, that the electrode 40 has a narrowed lower region that extends along the rectangular strip 57 to overlap the cup shaped regions 22 at contact points 58. (See also FIGS. 19, 24, 26A-B, and 28).

FIG. 22 OF CASAGRANDE



The extended rectangular shape of the narrowed lower portion of electrode 40 consequently has a center that is offset from the facing surface of the vertical portion of the cup shaped electrodes 22. Applicants submit that Casagrande does not disclose a top electrode that has a tip having a center along a length and width that is aligned with a center of the facing surface of the vertical portion of the bottom electrode.

For at least these reasons, it is submitted that Casagrande does not anticipate amended Claim 2.

Independent Claims 6, 13, and 22 have been amended to include similar recitations to amended Claim 2 and, consequently, are submitted to not be anticipated by Casagrande for at least the reasons explained above for Claim 2.

The dependent claims are patentable over Casagrande based at least on their dependence from the patentability of the independent claims from which they depend. Moreover, these claims are submitted to provide independent basis for patentability.

New Dependent Claims 37-44 are Not Anticipated by Casagrande

New Claim 37 recites that the tip of the top electrode forms a sharp point that is substantially more narrow than the facing surface of the vertical portion of the bottom electrode. For example, as shown in FIG. 17 of the present application, the tip forms a point that can substantially concentrate the localized electric field in the phase changeable material layer. In contrast, Casagrande shows, for example in FIG. 23, a metal layer 40 having a narrowed lower region that is wider than the facing surface of the vertical portion of the bottom electrode 22. Accordingly, Applicants submit that Casagrande does not anticipate new Claim 37.

New Claims 39, 41, and 43 contain similar recitations to Claim 37 and are submitted to not be anticipated by Casagrande for at least the reasons explained above regarding Claim 37.

New Claim 38 recites that a center of the top electrode is substantially aligned with the center of the facing surface of the vertical portion of the bottom electrode. An exemplary embodiment of Claim 38 is shown in FIG. 6A of the present application in which the top electrode is centered over a facing surface of the vertical portion of the bottom electrode. In contrast, as explained above, Casagrande describes and shows an electrode 40 that has a center that is offset from the facing surface of the vertical portion of the cup shaped electrodes 22. Accordingly, Applicants submit that Casagrande does not anticipate new Claim 38.

New Claims 40, 42, and 44 contain similar recitations to Claim 38 and are submitted to not be anticipated by Casagrande for at least the reasons explained above regarding Claim 38.

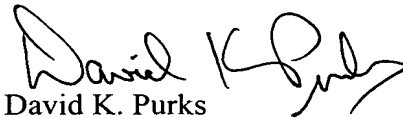
CONCLUSION

In light of the above amendments and remarks, Applicants respectfully submit that the above-entitled application is now in condition for allowance. Favorable reconsideration of this application, as amended, is respectfully requested. If, in the

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Application No.: 10/651,877
Filed: August 29, 2003
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opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (919) 854-1400.

Respectfully submitted,

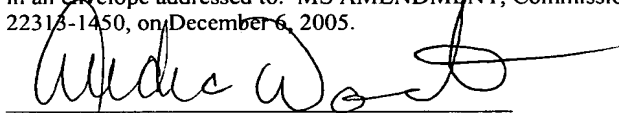


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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: MS AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on December 6, 2005.


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